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3

The *Human* Side of Veterinary Medicine
Client husbandry 166

Career Pathways in Veterinary Medicine
Air Force Environmental Health Services:
The embodiment of veterinary public health 169

Efficacy of the morantel sustained-release bolus in grazing cattle 177

Regression of lymphosarcoma in a dog 222

Economic Note
Animal health expenditures by livestock producers 236

Proceedings of Symposium on the Case for Responsible Extra-Label Drug Use 241–270

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Letters

More viewpoints on "Veterinary Technician" . . 140
Anthrax vaccines 141
Thoughts on merchandising 141
Improving animal welfare 142
Decries "negative thinking" in profession 143

News

Courts Rule on Veterinary Drug Issues:
US District Court Rules Bulk Drug Distribution Is Legal 145
Extra-Label Drug Use Suit Dismissed 145
AABP Members Meet in Valley of the Sun 147
US Animal Health Association Issues 40 Resolutions 151
Reproductive Efficiency Accented at Agricultural Press Conference 152
My Three Weeks Inside AVMA: A Veterinary Student's Story 154
Massachusetts VMA Celebrates Centennial . . . 158
Call for Papers: Pan American Congress 161
Certification Examinations 163
State Board Examinations 164
Deaths 164

The *Human* Side of Veterinary Medicine

Client husbandry—*Jacob Antelyes* 166

Career Pathways in Veterinary Medicine

Air Force Environmental Health Services: The embodiment of veterinary public health—*J. Kevin Grayson* 169

Interpretive Summaries of Articles in This Issue

. 173

Reports of Original Studies

Efficacy of the morantel sustained-release bolus in grazing cattle in North America—*D. H. Bliss and T. J. Newby* 177

Bovine brucellosis: An investigation of latency in progeny of culture-positive cows—*Winthrop C. Ray, Robert R. Brown, David A. Stringfellow, Paul R. Schnurrenberger, Charles M. Scanlan, and A. Ian Swann* 182

Factors influencing litter size in swine: Parity-one females—*L. Kirk Clark, Allen D. Leman, and Roger Morris* 187

Sensitivity and specificity of radioimmunoassay of serum trypsin-like immunoreactivity for the diagnosis of canine exocrine pancreatic insufficiency—*David A. Williams and Roger M. Batt* 195

Clinical Reports

Dorsal glottic stenosis after bilateral arytenoidectomy in two horses—*I. W. Harrison and C. W. Raker* 202

Acute mastitis and disseminated intravascular coagulopathy caused by *Pasteurella haemolytica* in a cow—*Mary L. Kiper and D. P. Paulsen* 205

Uterine torsion of 720° in a midgestation cow—*Pamela L. Ruegg* 207

Jejunojejunal intussusception associated with a transmural adenocarcinoma in an aged cow—*R. Michael Archer, A. James Cooley, Kenneth W. Hinchcliff, and Donald F. Smith* 209

Acute hypocalcemia associated with infarction of parathyroid gland adenomas in two dogs—*Thomas J. Rosol, Dennis J. Chew, Charles C. Capen, and Robert G. Sherding* 212

Intracranial dermoid cyst in a dog—*Monica Howard-Martin and Mary H. Bowles* . . . 215

Identification of *Histoplasma* organisms in circulating eosinophils of a dog—*Kenneth D. Clinkenbeard, Rick L. Cowell, and Ronald D. Tyler* 217

Primary pulmonary adenocarcinoma with brain stem metastasis in a dog—*Jayma A. Moore and H. Wayne Taylor* 219

Spontaneous regression of lymphosarcoma in a dog—*Steven N. Schwartz* 222

Electrocardiographic abnormalities associated with tetanus in two dogs—*David L. Panciera, Claudia J. Baldwin, and Bruce W. Keene* 225

Reports of Retrospective Studies

Gray-scale ultrasonography in the diagnosis of adrenal neoplasia in dogs: Six cases (1981–1986)—*Ellen M. Poffenbarger, Daniel A. Feeney, and David W. Hayden* 228

Small intestinal adenocarcinoma in cats: 32 cases (1978–1985)—*Jane E. Kosovsky, David T. Matthiesen, and Amiya K. Patnaik* 233

Economic Note

Animal health expenditures by livestock producers—*J. Karl Wise* 236

What Is Your Diagnosis?

M. J. Reeves and J. Traub-Dargatz 239

Proceedings of Symposium on the Case for Responsible Extra-Label Drug Use

Introduction and overview—*Jack W. Morse* 241

Privileges and responsibilities relating to extra-label drug use—*Dan W. Upson* 242

Use of human-label drugs in veterinary medicine—*James S. Reid* 247

Toward responsible use of the proper dosage of veterinary drugs—*T. E. Powers, J. D. Powers, and K. J. Varma* 250

Administration of pharmaceutical preparations by extra-label routes: Special considerations and potential pitfalls—*William L. Jenkins and Lynn G. Friedlander* 256

Dynamics of preparation of parenteral and other drugs by veterinary practitioners—*C. M. Stowe* 262

Specific information regarding withholding times associated with extra-label drug uses: Selective condemnation—*H. Dwight Mercer* .. 265

Quality assurance through residue screening—*R. E. Engel* 268

Book Reviews

Equine Surgery Advanced Techniques 194
Vitamin Tolerance of Animals 232
Veterinary Epidemiology: Principles and Methods 238
Books received but not reviewed 204

Announcements

Coming Meetings 271
Foreign Meetings 275
Educational Opportunities 278
Applications for Membership 283

Classified Ads 285

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Animal health expenditures by livestock producers

In conjunction with the recent American Veterinary Medical Association study on the US market for food animal veterinary medical services, a national survey of livestock producers was conducted in 1986 to secure veterinary medical service and product expenditure data.[1,2] Analysis of the survey was based on 2,044 usable questionnaires, including 894 primarily beef producers, 417 dairy producers, 338 hog producers, and 395 sheep producers.

Livestock production expenses vary by size of the operation. Tables 1 through 4 show the variation in use of veterinarians and animal health expenses according to size of herd for all 4 types of livestock operation. For this analysis, operations were categorized according to 3 herd sizes: 1 to 49 animals, 50 to 99 animals, and ≤100 animals.

In all types of livestock operations, expenses for animal health products and services increase with greater herd sizes. Most of the increase, however, is in product expenses rather than service expenses.

Regarding hog producers, for example, Table 3 shows that total animal health expenses increase from $550 for 1-to-49-animal operations to $2,000 for ≥100-animal operations. For the same 2 herd-size classes, animal health product expenses increased from $400 to $1,660. While the small producer spends fewer dollars on animal health than does the large producer, the small producer spends only 73 cents of his animal health dollar on products, whereas the large producer spends 83 cents on products.

Another way to view the increased emphasis on animal health products is through the use of the ratio of product expenses to service expenses. For a small hog operation, the ratio was 2.7:1 ($400/$150). For larger hog operations, the product-to-service expense ratio was 4.9:1 ($1,660/$340). These data show that owners of larger operations tend to spend more of their animal health dollar on products than do owners of smaller operations. This is also true for beef, dairy, and sheep producers.

Tables 1 through 4 also show that owners of various-sized operations spend various proportions of their animal health dollar with the veterinarian. As operations grow, producers spend less money on services and more on products. As a result, veterinarians' revenues from large operations are based more on product sales than on services.

Using beef operations as an example, Table 2 shows that annual expenses for veterinary ser-

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*Table 1—Beef producers: Animal health expenditures, by herd size, 1985**

	1 to 49 animals	50 to 99 animals	≥100 animals
Herd size	25	65	200
Times used veterinarian/yr	3	4	6
Expenses/year with veterinarian	$250	$375	$1,000
Animal health expenses			
Animal health products	$165	$350	$930
	(55%)	(64%)	(69%)
Animal health services	$135	$200	$420
	(45%)	(36%)	(31%)
Total	$300	$550	$1,350

*All values are medians.

*Table 2—Dairy producers: Animal health expenditures, by herd size, 1985**

	1 to 49 animals	50 to 99 animals	≥100 animals
Herd size	38	65	138
Times used veterinarian/yr	15	20	25
Expenses/year with veterinarian	$800	$1,500	$3,050
Animal health expenses			
Animals health products	$500	$870	$2,000
	(50%)	(50%)	(57%)
Animal health services	$500	$865	$1,500
	(50%)	(50%)	(43%)
Total	$1,000	$1,735	$3,500

*All values are medians.

*Table 3—Hog producers: Animal health expenditures, by herd size, 1985**

	1 to 49 animals	50 to 99 animals	≥100 animals
Herd size	30	60	315
Times used veterinarian/yr	5	6	6
Expenses/year with veterinarian	$292	$700	$800
Animal health expenses			
Animal health products	$400	$775	$1,660
	(73%)	(69%)	(83%)
Animal health services	$150	$350	$340
	(27%)	(31%)	(17%)
Total	$550	$1,125	$2,000

*All values are medians.

*Table 4—Sheep producers: Animal health expenditures, by herd size, 1985**

	1 to 49 animals	50 to 99 animals	≥100 animals
Herd size	30	60	170
Times used veterinarian/yr	4	5	6
Expenses/year with veterinarian	$200	$300	$600
Animal health expenses			
Animal health products	$170	$425	$700
	(60%)	(69%)	(70%)
Animal health services	$112	$187	$300
	(40%)	(31%)	(30%)
Total	$282	$612	$1,000

*All values are medians.

vices increased from $250 for 1-to-49-animal operations to $1,000 for ≥100-animal operations. Assuming that all the animal health services were performed by veterinarians, the proportion of veterinarian expenditures attributable to services was 54% ($135/$250) for 1-to-49-animal operations, and 42% ($420/$1,000) for ≥100-animal operations. Beef producers' animal health expenses to the veterinarian increased, but not by as much as total animal expenses; most of the veterinarians' gain in expenses came from product purchases rather than service utilization.

Dairy producers spend the most money of any type of producer on animal health products and services, regardless of size of operation. For the 1-to-49-animal operation, $1,000 was the median amount spent on animal health products and services—$500 on products and $500 on services; of the $1,000, $800 was spent with the veterinarian: $500 (62%) of that was attributable to service, leaving $300 in product purchases from the veterinarian. For the ≥100-animal operation, the producer spent $3,050 with the veterinarian, of which $1,500 (49%) was service expenditures, leaving $1,550 in product purchases from the veterinarian. Since dairy producers with ≥100-animals spent $2,000 on products, 75% of dairy producers' product purchases were with veterinarians.

In general, owners of larger livestock farms and ranches spend proportionately more on animal health products and proportionately less on animal health services than do owners of smaller operations. In addition, owners of larger livestock operations spend proportionately less of their animal health dollar with the veterinarian than do owners of smaller livestock operations. A corollary conclusion is that product expenditures are a greater proportion of the total veterinarian expenses for larger operations than for smaller operations.

Table 5 shows producers' animal health product purchases by supplier. The veterinarian receives about 42 cents of every dollar spent for animal health products by the average beef producer. Likewise, the veterinarian receives 53 cents of the dairy producers' animal health product dollar, 34 cents of the hog producers' animal health product dollar, and 28 cents of the sheep producers' animal health product dollar.

The feed store/dealer receives the second highest share of producers' animal health product expenses, with the exception of

Table 5—Percentage of 1985 animal health product expenses, by supplier

	Beef	Dairy	Hog	Sheep
Veterinarian	42	53	34	28
Feed store/dealer	34	22	40	25
Mail order distributor	8	11	8	35
Cooperative	10	8	10	6
Traveling distributor	4	4	6	2
Other supplier	2	2	2	4
Total	100%	100%	100%	100%

Table 6—Average service and product expenses with veterinarian and number of operations that used a veterinarian, 1985

	Total market veterinarians (millions)		Average* service + product expense at veterinarian		Farms that purchased from a veterinarian (thous)		Total No. livestock farms (thous)
Beef producers	$214.9	+	$315	=	682.2	71%†	957.7
Dairy producers	$300.9	+	$1,090	=	276.0	99%	277.8
Hog producers	$98.0	+	$524	=	187.0	57%	329.8
Sheep producers	$24.2	+	$310	=	78.1	77%	101.6
Total	$638.0	+	$522	=	1,223.3	73%	1,666.9

*Weighted average expense based on average veterinary expenses according to population of livestock operations of various herd sizes.

†Estimated percentage of farm operations using a veterinarian.

hog producers. For every dollar spent on animal health products, the hog producer spends 40 cents at the feed store, and only 34 cents with the veterinarian.

Average annual veterinary service and product expenditures were developed from the national survey of livestock producers and were weighted by the US populations of livestock operations and their distributions according to herd size of operation.

Table 6 reveals that, in 1985, 71% of beef producers used a veterinarian and spent $315, on average, for the year. Very nearly all dairy producers were estimated to have purchased services and/or products from a veterinarian, with an average annual expenditure of $1,090/producer. Hog producers were estimated to not use a veterinarian as much as other livestock producers. Only 57% of hog producers used a veterinarian for services or product purchases, with an annual expenditure of $524/producer. Approximately 78% of sheep producers used a veterinarian, with an average annual expenditure of $310 per sheep producer.

References

1. Wise JK. US market for food animal veterinary medical services. *J Am Vet Med Assoc* 1987;190:1530–1533.
2. Wise JK. *The US market for food animal veterinary medical services.* Schaumburg, Ill: American Veterinary Medical Association, 1987.

Book Review: Veterinary Epidemiology: Principles and Methods

This book is a welcome addition to the limited selection of veterinary epidemiology texts. It is comprehensive and thorough in its coverage and provides the basis for a 60- to 80-hour course. Epidemiologic methods are discussed in the content of specific veterinary applications in population medicine. The first section, "Basic Principles", discusses sampling strategies, measures of disease frequency, and evaluation of diagnostic test performance. The second section, "Studying Disease in Animal Populations", discusses medical ecology and measures of disease occurrence, estabishing cause, study designs, and systems analysis. The last 2 sections, "Animal Health Economics" and "Applied Epidemiology", deal with economic analysis, disease control strategies, and surveillance. Topics are frequently cross-referenced. The index is extensive, although some terms used in the text are not referenced. The chapter on "Animal Health Economics" is outstanding. It provides an excellent example of how to apply epidemiologic analyses to economic decision-making. Some methodologic issues may be difficult for veterinary students to follow without further explanation. An introduction to descriptive and inferential biostatistics would have been helpful for understanding the statistical analyses. There is limited discussion of the application of epidemiology to medical decision-making at the individual animal vs the herd level. However, examples easily could be developed by instructors. In light of the dearth of comprehensive veterinary epidemiology texts, this book should be of interest to veterinary professional and graduate students, researchers, and practitioners.—[*Veterinary Epidemiology: Principles and Methods. By S. Wayne Martin, Alan H. Meek, and Preben Willeberg. 343 pages; illustrated. Iowa State University Press, 2121 S State Ave, Ames, IA 50010. 1987. Price $30.95.*]—R. D. SMITH